

FARM FACTS

Coriander in Saskatchewan

Produced by Saskatchewan Agriculture and Food

Coriander (*Coriandrum sativum*), a member of the Umbelliferae or carrot family, is an annual spice crop. It has an erect, branching stem growing to a height of approximately 0.6-1 m (2-3 ft).

The fresh green herb is called cilantro or Chinese parsley. It is used in East Indian, Chinese and Mexican cuisine and recently in Canada for flavouring salads and soups.

The mature, round fruit contains two fused seeds. The market demands intact fruits since much of the essential oil volatilizes from split fruit or individual seeds. Mature seeds have a pleasant, spicy aroma. Coriander powder is made from ground seeds and is used to flavour many products such as curry, gin and prepared meats.

There are two types of coriander, the large seeded (fruited) and small seeded. Large seeded coriander (seed diameter of 3-5 mm) is grown as a winter crop in areas with a Mediterranean climate, and as a spring crop in northern temperate climates. The most common type grown in Saskatchewan is large-seeded which has an essential oil content of 0.5-1%. It grows to a height of approximately 0.6 m (2 ft). Its

growing season requirement is approximately 100-105 days.

Small-seeded (cilantro) coriander is produced mainly in moderate temperate regions. It has a longer growing season requirement of approximately 115-120 days. Small-seeded coriander is somewhat taller, approximately 1 m (3 ft), and contains more essential oil.

Small-seeded coriander grown in Saskatchewan has an essential oil content of 1-1.5%. Volatile oils such as linalool are responsible for the aroma of coriander. The essential oil of coriander should contain 60-70% linalool.

Production of coriander in Saskatchewan increased to over 12,000 ha (30,000 ac) in 1998. Production declined in 1999 to approximately 8,000 ha (20,000 ac). Average yield of large-seeded coriander in Saskatchewan is approximately 900 kg/ha (800 lbs/ac). Small-seeded coriander yield can be slightly more, if it matures. The bushel weight of coriander is 22-25 lbs.

Adaptation

Coriander is a heat-loving crop. It may be grown on a fairly wide range of soils, but is best adapted

to well-drained loam and sandy-loam soils.

Coriander germinates very slowly and may take as long as 21 days to emerge. It does not compete successfully with weeds, especially perennial weeds, and should be planted on clean land. Plants can suffer flower blast if hot, dry conditions occur at bloom.

In recent years, some coriander and caraway crops have been severely affected by flower blight (see Disease Control). More severe infections have occurred in cool, wet environmental conditions or in fields where volunteer coriander seedlings have been allowed to develop to the flowering stage. Coriander should not be planted in the same field more than once in four years to avoid losses due to plant diseases.

Coriander yields can benefit from the presence of insect pollinators including honey bees.

Seeding

The recommended seeding rate for large-seeded coriander is 33 kg/ha (30 lbs/ac), and 18 kg/ha (16 lb/ac) for the small-seeded coriander. This is approximately 36 fruits / m of row in rows 15-17 cm apart. Each mature fruit contains two seeds.

Research results indicate no yield differences between using intact or split fruits as seed. The recommended seeding depth is 2.5-4 cm (1-1½ in). Coriander requires a firm, moist seedbed to enhance germination and speed plant emergence. Any seeding equipment that will provide these conditions is suitable.

Coriander should be seeded in late April to mid-May. Emergence may take 21 or more days, and seedlings have some tolerance to spring frost. Research results have indicated higher seed yields and oil levels can be achieved by seeding earlier than May 20. Seeding into dry soil can delay germination.

Fall seeding of coriander is being tested, with fall-seeded crops being harvested approximately 2 weeks earlier than spring-seeded crops. Preliminary results indicate that to avoid uptake of moisture and germination in the fall, seeding should take place just prior to or at freeze up. Increasing seeding rate does not appear to provide any yield advantage.

Fertilization

Soil testing prior to seeding will provide a good assessment of soil nutrient levels and balance. Recent research indicates that coriander uses about 30% less nitrogen (N) than a canola crop. Soil N plus fertilizer N should be 55-75 kg/ha (50-70 lb/ac) with the higher end of the range for more moist growing conditions. However, field research results reveal very little yield response of coriander to the addition of N fertilizer, if soil test N levels exceed 40 kg/ha (36 lb/ac).

Since coriander has a small seed, the rates of seed-placed N fertilizer should not exceed those of canola under good to excellent soil moisture conditions.

It is recommended that seed-placed phosphate fertilizer not exceed 22 kg/ha (20 lb/ac) actual P_2O_5 with 2.5 cm (1 in) spread and 15-17.5 cm (6-7 in) row spacing, under good to excellent soil moisture conditions.

For more information on fertilizers and their application, refer to Saskatchewan Agriculture and Food publication, *Guidelines for safe rates of fertilizer applied with the seed*.

Weed Control

Coriander may take 21 days to emerge after planting, and is not a good competitor with weeds. Severe weed competition can occur unless the crop is seeded in clean fields. Some producers use a post-planting application of ROUNDUP® (glyphosate) to control grass and broadleaf weeds in the time period between planting and emergence of the coriander.

Control of perennial weeds in the crop is very difficult and is best done in the year prior to planting coriander with a pre-harvest glyphosate treatment. EDGE® herbicide is registered for use in coriander to control annual grass and some annual broadleaf weeds. POAST® herbicide is registered in coriander for the control of annual grass weeds. AFOLAN®F (linuron) is registered for post-emergence control of some annual broadleaf weeds in coriander.

POAST and AFOLAN®F should not be applied as a tank mix.

For more information on weed control and herbicides consult the Saskatchewan Agriculture and Food publication, *Guide to Crop Protection*, or the product label.

Insect Control

No insecticides are registered for use in coriander. Grasshoppers are an insect pest in coriander as their heads and other body parts can contaminate the grain sample and cause downgrading or rejection.

Leaf hoppers can also be of economic importance because they can spread aster yellows disease. Attempts should be made to prevent the spread of leaf hoppers into the crop area.

Disease Control

Several commonly occurring root diseases, such as damping off and seedling rot, can infect coriander seedlings. Symptoms include yellowing and death of newly emerged seedlings. Research results indicate that seed-applied fungicides have no consistent effect in improving seed yield in coriander.

It is important to use clean seed to reduce the risk of seedling diseases. Crop rotations, which provide a break from members of the carrot family for several years, will help to prevent the build up of diseases.

Aster yellows is a viral-like plant disease which commonly infects

members of the carrot family and other crops such as canola and echinacea. Caraway and dill are more susceptible than coriander. The disease causes yellowing of infected plants and flower parts become malformed. Infected plants will often be taller than unaffected plants and will not set seed. The disease is spread from infected to healthy plants by leaf hoppers.

Aster yellows overwinters in crowns of biennial or perennial weeds or crops and is not seed-borne or soil-borne. No crop protection products are registered for the control of aster yellows in coriander. Crop rotations where no members of the carrot family are planted in the field and no volunteer plants are evident can minimize the disease.



Flower blight in coriander

Coriander and caraway crops have been attacked by flower blight in recent years. *Alternaria* sp., *Ascochyta* sp. and *Fusarium* sp. have been identified by the Crop Protection Laboratory on samples

collected from infected fields. Symptoms include emerging flowers that turn brown and black on plants that otherwise appear normal. Flowers continue to die as they emerge and very little seed is produced in infected areas. Severely infected fields produce little seed.

Some producers have tried to control the disease with seed treatment fungicides or foliar fungicide treatments, but without favourable results.

Alternaria has been identified in all samples of both plant and resulting seed, but has not been confirmed as the cause of the flower blight. Producers are advised to use the best seed available and maintain crop rotations which plant coriander or caraway no more frequently than one in four years.

Research is underway to identify the cause of coriander flower blight and determine potential methods of prevention and control.

Coriander is also susceptible to sclerotinia, a disease causing stem rot in many broadleaved crops including canola and pea. Do not plant coriander on canola stubble and use good agronomic practices such as balanced fertility and weed control. This disease can cause stem rot, breakage and yield loss. Sclerotinia will likely only be a concern in wet years or in areas with canola and pea production.

Sooty mould is a fungal disease which may develop on the stems and fruits of near mature crops that have been damaged by hail, wind or heavy rain. It can cause

discolouration of the sample. The crop should be harvested as soon as possible to prevent deterioration in the field.

Harvesting

Straight combining when the crop is fully mature is the preferred harvest method for coriander. The crop can be swathed when the fruit turns tan to brown, however large and fluffy swaths can be very susceptible to wind damage. Swathing or combining in damp weather or when dew is present will help to avoid shattering losses.

Combine when the moisture content is less than 15%. A moisture content of 10% is considered dry, but many buyers prefer a moisture content of 9%. Cylinder or rotor speed should be set to approximately 500 RPM under dry conditions. An initial concave setting of 20 mm ($\frac{1}{2}$ in) at the front, and 10 mm ($\frac{1}{4}$ in) at the back is suggested. Wind speed should be set high enough to reduce dockage, and the return should be minimized as much as possible. Reduced ground speed may be required. Coriander containing over 5% split fruit is usually discounted at time of purchase.

Storage

Some producers use a moisture meter to determine moisture levels in coriander samples. For 10% moisture on a 3.5" Moisture Meter, use the sunflower chart; a 150 g sample; and calibrate @73. The microwave oven technique can also be used to determine the

moisture content of seed samples. Weigh 100 g of seed and place in microwave for 30-second intervals. Weigh the seeds between each interval. Repeat until the seed weight becomes constant after three intervals.

Per cent seed moisture content equals
$$\frac{100 \text{ g} - \text{weight of seed after drying (g)}}{\text{weight of seed after drying (g)}} \times 100$$

Coriander seed must cure during storage. Natural air drying or aeration is necessary for curing. Coriander oil is very volatile and hot air drying should be avoided if possible.

Green material should be cleaned from the sample as soon as possible. Avoid the concentration in the bin of green material such as weed seeds. The higher density of the green material prevents even airflow during aeration and increased spoilage can occur. The sample must be free of evidence of rodents and other foreign material at the time of sale.

Processing and Grading

Grading standards for coriander are not set by the Canadian Grain Commission. However, buyers request the product be cleaned to the standards set by the American Spice Trade Association. A high percentage of clean out often occurs during cleaning, and dockage levels can reach 15-30%.

A number of special crop processors in the province clean and bag coriander. A list of special crop

processors is available at Rural Service Centres in Saskatchewan. Coriander is graded by the buyer according to its aroma and appearance. Factors such as colour, stems, splits, and foreign material are taken into account. Buyers prefer a light tan colour with at least 99.5% pure whole seed.

Marketing

Several special crop marketing companies offer production contracts for coriander. The Saskatchewan Agriculture and Food publication, *Saskatchewan Special Crop Marketing Company Synopsis*, is an annually updated list of the companies buying and contracting special crops.

The end-use market for coriander exists mainly in the large urban centres of North America. In 1998, Canada also exported coriander seed to Brazil, Japan, Morocco, Netherlands, Spain, and United Kingdom. Prices are often based FOB New York, cleaned and bagged. Farm prices for cleaned coriander in recent years have ranged from 33-66¢/kg (15-30¢/lb).

Competitors to Canada for the export of coriander are Morocco, Romania, Bulgaria, Argentina and India. Moroccan coriander is often priced at a discount. Production in Canada should focus on high quality and consistent seed size to compete in export markets.

Economics of Production

The Saskatchewan Agriculture and Food FarmFacts publication, *Crop Planning Guide-Alternative Crops*, provides annually updated information on the costs of production and expected returns from coriander production.

Additional Information

Saskatchewan Herb and Spice Association

Website address: http://paridss.usask.ca/specialcrop/commodity/herb_spice/about.html

The Grower's Guide to Herbs and Spices (306) 727-4917

Saskatchewan Agriculture and Food

- Rural Service Centres in Saskatchewan
- Website address: www.agr.gov.sk.ca/
- Guidelines for safe rates of fertilizer applied with the seed
- Specialty Crop Report
- Saskatchewan Special Crop Marketing Company Synopsis
- Crop Planning Guide - Alternative Crops
- Guide to Crop Protection

Written and edited by:

R. McVicar, P. Pearse, K. Panchuk, S. Hartley, C. Brenzil, Saskatchewan Agriculture and Food

Dr. A.E. Slinkard, F.A. Holm, University of Saskatchewan